In the claims:

1. A monolithic polymeric filter membrane comprising:

(a) a polymeric filter layer including micron-scale precision-shaped pores and

(b) a polymeric support layer including a precision-shaped porous support structure for the filter layer.

2. The filter membrane of claim 1 in which the support layer is thicker than the filter layer.

3. The filter membrane of claim 2 in which the support layer is thicker than the filter layer by a factor of between about 2 and 250.

4. The filter membrane of claim 1 in which the support layer is substantially coextensive with the filter layer.

5. The filter membrane of claim 1 in which the support layer includes at least two sublayers, a first sublayer of a selected porosity and a second sublayer of different porosity than the first sublayer and disposed between the first sublayer and the filter layer.

6. The filter membrane of claim 1 in which the support structure comprises a first plurality of spaced apart support struts, the struts being spaced apart a distance substantially greater than the size of the micron-scale pores.

7. The filter membrane of claim 6 in which the support structure comprises a second plurality of spaced apart support struts, the second plurality of struts intersecting the first plurality of struts to define a support grid.

8. The filter membrane of claim 6 or 7 in which the struts are spaced apart a distance in the range of about 50 to 1000 microns.

9. The filter membrane of claim 6 or 7 in which the struts are between about 10 and 100 microns in width.

10. The filter membrane of claim 1 in which the support structure comprises a support grid.

11. The filter membrane of claim 10 in which the support grid comprises at least two subgrids, a first subgrid comprising struts of selected width and spaced apart a selected distance and a second subgrid disposed between the first subgrid and the filter layer, the second subgrid including support struts of different width or spacing than the struts in the first subgrid.

12. The membrane of claim 10 in which the grid comprises a plurality of intersecting walls, said walls being curved at least at the intersections.

13. The filter membrane of claim 12 in which the grid comprises a plurality of intersecting walls defined by spaced apart, generally cylindrically or elliptically shaped pores.

14. The filter membrane of claim 1 in which the filter layer and support layer are comprised of different materials that are sufficiently compatible to form a monolithic membrane.

15. The filter membrane of claim 1 in which the filter layer and the support layer are defined on opposite sides of a single film, the pores communicating with the porous support structure to allow the passage of filtrate therethrough.

16. The filter membrane of claim 1 in which the filter layer and support layer are formed separately of the same material and joined together to form the monolithic membrane.

17. The filter membrane of claim 1 in which the polymeric material of the filter layer is photosensitive, etchable or suitable for laser ablation or x-ray treatment, and the polymeric material of the support layer is photosensitive, etchable or suitable for laser ablation or x-ray treatment.

18. The filter membrane of claim 1 in which the polymeric material of the filter layer is etchable, and the polymeric material of the support layer is photosensitive or suitable for laser ablation.

19. The filter membrane of claim 1 in which the polymeric material of the filter layer and support layer is an etchable polyimide material.

20. The filter membrane of claim 1 in which the polymeric material of the filter layer and the support layer comprises photosensitive polyimide material.

21. The filter membrane of claim 1 in which the filter membrane is flexible.

22. The filter membrane of claim 21 in which the filter membrane is sufficiently flexible to be disposed along a radius of curvature of at least one-half inch.

23. The filter membrane of claim 1 in which the pore size is less than or equal to about 20 microns.

24. The filter membrane of claim 1 in which the pore size is less than or equal to about 0.65 microns.

25. The filter membrane of claim 1 in which the pore size is less than or equal to about 0.22 microns.

26. The filter membrane of claim 1 in which the pore size is less than or equal to about 2 microns.

27. The filter membrane of claim 1 in which the pore size is less than or equal to about 0.08 microns.

28. The filter membrane of claim 1 in which said micron-scale precision-shaped pores are non-circular.

29. The filter membrane of claim 28 in which said pores are elongated.

30. The filter membrane of claim 28 in which the pores are sized and shaped to prevent the passage of human blood white cells and permit the passage of red cells and platelets.

31. A separator comprising:

a housing including a fluid inlet and a first fluid outlet,

a flow path defined in said housing between said inlet and said first outlet,

a monolithic polymeric filter membrane disposed in the flow path to allow filtrate to pass therethrough, such membrane comprising:

a filter layer including micron-scale precision-shaped pores through which filtrate may pass, and

a support layer including a precision-shaped porous support structure for the filter layer.

32. The separator of claim 31 in which the filter membrane is curved.

33. The separator of claim 32 in which the filter membrane is curved along a radius of curvature of at least about one-half inch.

34. A separator for separating one or more components of a suspension, the separator comprising:

a housing defining a generally cylindrical interior surface;

a rotor rotatably mounted within the housing and including a generally cylindrical outer surface spaced from the interior surface of the housing;

a monolithic flexible polymeric membrane disposed on selected of the generally cylindrical outer surface of the rotor and the generally cylindrical interior surface of the housing;

the flexible membrane comprising a filter layer including micron-scale precision-shaped pores and a support layer including a precision-shaped porous support layer for the filter layer;

an inlet in the housing for introducing suspension into the space between the rotor and housing surfaces;

a first outlet in the housing for removing a portion of the suspension from the space between the rotor and housing surfaces; and

a second outlet communicating with the support layer of the membrane for removing any filtrate passing through the membrane.

35. The separator of claim 34 in which the membrane is curved to conform to the generally cylindrical surface of the rotor or housing on which it is disposed.

36. The separator of claim 31 or 34 in which the support layer is thicker than the filter layer.

37. The separator of claim 36 in which the support layer is thicker than the filter layer by a factor of between about 2 and 250.

38. The separator of claim 31 or 34 in which the support layer is substantially coextensive with the filter layer.

39. The separator of claim 31 or 34 in which the support layer includes at least two sublayers, a first sublayer of a selected porosity and a second sublayer of different porosity than the first sublayer and disposed between the first sublayer and the filter layer.

40. The separator of claim 31 or 34 in which the support structure comprises a first plurality of spaced apart support struts, the struts being spaced apart a distance substantially greater than the size of the micron-scale pores.

41. The separator of claim 40 in which the support structure comprises a second plurality of spaced apart support struts, the second plurality of struts intersecting the first plurality of struts to define a support grid.

42. The separator of claim 40 in which the struts are spaced apart a distance in the range of about 50 to 1000 microns.

43. The filter membrane of claim 40 in which the struts are between about 10 and 100 microns in width.

44. The separator of claim 31 or 34 in which the support structure comprises a support grid.

45. The separator of claim 44 in which the support grid comprises at least two subgrids, a first subgrid comprising struts of selected width and spaced apart a selected distance and a second subgrid disposed between the first subgrid and the filter layer, the second subgrid including support struts of different width or spacing than the struts in the first subgrid.

46. The separator of claim 44 in which the grid comprises a plurality of intersecting walls, said walls being curved at least at the intersections.

47. The separator of claim 46 in which the grid comprises a plurality of intersecting walls defined by spaced apart, generally cylindrically or elliptically shaped pores.

48. The separator of claim 31 or 34 in which said pores are sized to separate red cells and white cells from plasma and platelets.

49. The separator of claim 31 or 34 in which the filter layer and support layer are comprised of different materials that are sufficiently compatible to form a monolithic membrane.

50. The separator of claim 31 or 34 in which the filter layer and the support layer are defined on opposite sides of a single film, the pores communicating with the porous support structure to allow the passage of filtrate therethrough.

51. The separator of claim 31 or 34 in which the filter layer and support layer are formed separately of the same material and joined together to form the monolithic membrane.

52. The separator of claim 31 or 34 in which the polymeric material of the filter layer is photosensitive, etchable or suitable for laser ablation or x-ray treatment, and the polymeric material of the support layer is photosensitive, etchable or suitable for laser ablation or x-ray treatment.

53. The separator of claim 31 or 34 in which the polymeric material of the filter layer is etchable, and the polymeric material of the support layer is photosensitive or suitable for laser ablation or x-ray treatment.

54. The separator of claim 31 or 34 in which the polymeric material of the filter layer and support layer is an etchable polyimide material.

55. The separator of claim 31 or 34 in which the polymeric material of the filter layer and the support layer comprises photosensitive polyimide material.

56. The separator of claim 31 or 34 in which the filter membrane is flexible.

57. The separator of claim 31 or 34 in which the pore size is less than or equal to about 20 microns.

58. The separator of claim 31 or 34 in which the pore size is less than or equal to about 0.65 microns.

59. The separator of claim 31 or 34 in which the pore size is less than or equal to about 0.22 microns.

60. The separator of claim 31 or 34 in which the pore size is less than or equal to about 2 microns.

61. The separator of claim 31 or 34 in which the pore size is less than 0.08 microns.

62. The separator of claim 31 or 34 in which said micron-scale precision-shaped pores are non-circular.

63. The separator of claim 62 in which said pores are elongated.

64. The separator of claim 62 in which the pores are sized and shaped to prevent the passage of human blood white cells and permit the passage of red cells and platelets.

65. A method for making a monolithic polymeric filter membrane comprising at least a filter layer including micron-scale precision-shaped pores and a support layer including a precision-shaped support structure for the filter layer, the method comprising:

forming the filter membrane layer by removing selected material from one side of a polymeric film to define the precision-shaped micron-scale pores of the filter layer; and

forming the support structure layer by removing selected material from the other side of

said membrane to define the precision-shaped porous support structure, the pores communicating with the porous support structure to allow the passage of filtrate therethrough.

66. A method for making a monolithic polymeric filter membrane comprising at least a filter layer including micron-scale precision-shaped pores therethrough and a support layer including a porous support structure for said filter layer, the method comprising:

forming the filter layer by removing selected material from a first polymeric film to define a plurality of micron-scale precision-shaped pores therethrough;

forming the support structure layer by removing selected material from a second polymeric film to define a precision-shaped porous support structure; and

joining the filter and support layers together in overlying relationship to form a monolithic filter membrane.

67. The method of claim 65 or 66 in which at least one of said filter layer and support layer is formed by:

providing a polymeric film that is of polyimide material

applying a metallic film to one surface of said polyimide film,

applying a photoresist material to said metallic film,

creating a first pattern on said photoresist layer to define micron scale pores or support structure and removing selected material from said photoresist layer;

removing material from said metallic film in the areas where said photoresist material has been removed; and

removing selected material from the polyimide film in the areas where the metallic film has been removed to define the pores or support structure;

removing any remaining photoresist material and the metallic film from the polyimide film.

68. The method of claim 65 or 66 in which at least one of said filter layer and said support layer comprises a photoimageable polymeric film and the at least one layer is formed by exposing the film to light through a mask defining a pattern and removing selected portions of said polymeric film defined by pattern to form the pores or support layer.

69. The method of claim 67 in which said polymeric film is a negative-acting photoimagable film and said removing is carried out by removing the non-exposed portions of said film.

70. The method of claim 67 in which said film is a positive-acting photoimagable film and said removing is carried out by removing the exposed portions of said film.

71. The method of claim 67 in which the removing of selected material from the polyimide film is carried out by dry etching.

72. The method of claim 65 or 66 in which at least one of the steps of removing material includes ablating the film by laser or treating the film with ionizing radiation.

73. The method of claim 72 employing an excimer laser to ablate said film.

74. The method of claim 65 or 66 in which the support layer is thicker than the filter layer.

75. The method of claim 74 wherein the support layer is thicker than the filter layer by a factor of between about 2 and 250.

76. The method of claim 68 wherein a continuous web of the photoimageable polymeric film is continuously supplied and the pattern is progressively created on said film and selected material is progressively removed to define the pores or support structure.

77. The method of claim 65 or 66 in which a continuous web of laser ablatable polymeric film is continuously supplied and selected material is progressively removed to define the pores or support structure.

78. The method of claim 68 in which said photoimageable polymeric film comprises a polyimide.

79. The method of claim 65 or 66 in which the support structure comprises a first plurality of spaced apart support struts in which said struts are spaced apart a distance substantially greater than the size of said micron-scale pores.

80. The method of claim 79 in which said support structure comprises a second plurality of spaced apart struts intersecting said first plurality of struts to define a support grid.

81. The method of claim 79 in which said struts are spaced apart a distance in the range of about 50 to 1000 microns.

82. The filter membrane of claim 79 in which the struts are between about 10 and 100 microns in width.

83. The method of claim 65 or 66 in which the support structure comprises a grid.

84. The method of claim 65 or 66 in which the support structure comprises at least two sublayers, a first sublayer of a selected porosity and a second sublayer of different porosity than the first sublayer and disposed between the first sublayer and the filter layer.

85. The method of claim 83 in which the support grid comprises at least two subgrids, a first subgrid comprising struts of selected width and spaced apart a selected distance and a second subgrid disposed between the first subgrid and the filter layer, the second

subgrid including support struts of different width or spacing than the struts in the first subgrid.

86. The method of claim 83 in which the grid comprises a plurality of intersecting walls, said walls being curved at least at the intersections.

87. The method of claim 86 in which the grid comprises a plurality of intersecting walls defined by spaced apart, generally cylindrically or elliptically shaped pores.

88. The method of claim 66 in which support structure layer is formed by removing material from two non-fully cured polymeric films, one film having material removed to define a support structure of selected porosity, and another film having material removed to define a support structure of greater porosity that the one film, said filter layers film and support films being bonded together to form an integral filter membrane.

89. The method of claim 65 or 66 in which the filter membrane is flexible.

90. The method of claim 89 in which the filter membrane is sufficiently flexible to be disposed along a radius of curvature of ½ inch.

91. A method for making a monolithic polymeric filter membrane of a predetermined thickness, the filter membrane comprising at least one filter layer with micron-scale precision-shaped pores and a support layer

including a precision-shaped support structure for said filter layer, the method comprising:

providing a substrate;

spinning a first polyimide layer onto the substrate;

applying a metal layer to the first polyimide layer;

applying photoresist to the metal layer;

developing the photoresist to define a first pattern of one of the micron-scale pores or support structure;

transferring the first pattern from said photoresist to said metal layer;

transferring the first pattern from the metal layer to said first polyimide layer so as to create one of said micron-scale pores or said support structure;

sequentially removing the photoresist and the metal layer;

spinning a second polyimide layer onto the first layer polyimide so as to create an interface therebetween;

creating a second pattern on the second polyimide layer to define the other of the micron-scale pores or the support structure;

removing selected material from the second polyimide layer to define the other of the micron-scale pores or support structure;

curing the first and second polyimide layers so as to remove the interface therebetween and create a monolithic filter layer-support structure; and

removing the integral filter layer-support structure from said substrate.

/ 92. A method for making a monolithic polymeric filter membrane of a predetermined thickness, the filter membrane comprising at least one filter layer with micron-scale precision-shaped pores and a support layer including a precision-shaped support structure for said filter layer, the method comprising:

providing a silicon wafer substrate;

spinning a first polyimide layer onto the silicon wafer;

exposing the first polyimide layer to light through a mask defining a first pattern of one of the micron-scale pores or support structure;

spinning a second polyimide layer onto the first layer polyimide so as to create an interface therebetween;

exposing the second polyimide layer to light through a mask defining a second pattern of the other of the micron-scale pores or the support structure;

removing selected material from the first and second polyimide layers to define the micron-scale pores and support structure;

curing the first and second polyimide layers so as to remove the interface therebetween and create a monolithic filter layer-support structure; and

removing the monolithic filter layer-support structure from said silicon wafer substrate.

93. The method of claim 92 in the removing of selected material from the first polyimide later is carried out before the second layer is spun onto the first layer.

94. A method for making a filter membrane comprising:

providing a flexible film having opposed, generally planar surfaces and a thickness between the surfaces;

ablating selected areas of one of the surfaces to a first selected depth to define a plurality of micron-scale precision-shaped pores on the one surface; and

ablating selected areas of the other of the surfaces to a second selected depth to define a porous precision-shaped support structure, the pores communicating with the porous support structure to allow the passage of filtrate therethrough.

95. The method of claim 94 in which the ablation is carried out by laser.

96. The method of claim 66 in which the first and second films are not fully cured at the time of the removal step, and the joining step includes curing the first and second films.

97. A method for making a monolithic polymeric filter membrane comprising at least a filter layer including micron-scale precision-shaped pores and a support layer including a precision-shaped support structure for the filter layer, the method comprising:

providing a polymeric film including a support structure defined on one side of the film;

forming the filter layer by removing selected material from the other side of the polymeric film to define precision-shape micron-scale pores of the filter layer.

98. The method of claim 97 wherein said support structure is embossed on said one side of said film.

99. The method of claim 97 in which said support structure is pre-cast on said one side of said film.

100. The method of claim 97 in which said forming step is carried out by etching, laser ablation, photoimaging or radiation.

101. The method of claim 91 in which the substrate comprises a silicon wafer.

102. The filter membrane of claim 1 in which the pore size is less than or equal to about 0.45 microns.